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CLAIMS

[Claim(s)]
[Claim 1] The pixel of a large number which are arranged in the shape of a matrix and output the signal according to the amount of incident light, Two or more storage means established to each of the perpendicular signal line which connected the pixel of the same train in common, Two or more 1st switching means which read the signal outputted from the pixel of the multi-line from which the storage time differs through a perpendicular signal line, and said two or more storage means are made to memorize, The solid state image sensor characterized by having two or more 2nd switching means which output the signal memorized by said two or more storage means through two or more level signal lines.
[Claim 2] The solid state image sensor according to claim 1 characterized by controlling the storage time of a pixel using an electronic shutter.
[Claim 3] The pixel of the line previously scanned as a video signal among the pixels of said multi-line is a solid state image sensor according to claim 1 characterized by setting up the storage time short rather than the pixel of the line scanned at the rear.
[Claim 4] Image pick-up equipment which carries out synchronization of two or more output signals from the solid state image sensor which acquires two or more output signals based on the pixel of the multi-line from which the storage time differs, and said solid state image sensor, and is characterized by having the digital disposal circuit which adds these and is outputted as a video signal.
[Claim 5] Said digital disposal circuit is image pick-up equipment according to claim 4 characterized by adding after letting the circuit which has linearity or nonlinear input-output behavioral characteristics for each output signal which carried out synchronization pass.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the image pick-up equipment using the X-Y address type solid state image sensor and this which can read the pixel information acquired especially by photo electric conversion per pixel about the image pick-up equipment which used a solid state image sensor and this.
[0002]
[Description of the Prior Art] In order to give a magnification function to the pixel itself, active elements (MOS transistor), such as metal-oxide-semiconductor structure, are used, and the pixel consists of magnification mold solid state image sensors which are kinds of a X-Y address type solid state image sensor. The conventional example of this magnification mold solid state image sensor is shown in drawing 8 . In drawing 8 , many pixel transistors 81 are arranged in the shape of a matrix, the gate electrode of each pixel transistor 81 is connected to the perpendicular selection line 82 per line, each source electrode is connected to the perpendicular signal line 83 per train, and supply voltage VD is further impressed to each drain electrode. Each perpendicular selection line 82 is connected to the outgoing end of the perpendicular scanner 84.
[0003] Each perpendicular signal line 83 is connected to the drain electrode of the NchMOS transistor 85 which is a switch of operation. While the source electrode of this MOS transistor 85 is connected to the end of load-carrying capacity 86, it connects with the drain electrode of the NchMOS transistor 87 which is a level switch, and of operation pulse phiOP is impressed to that gate electrode. The other end of load-carrying capacity 86 is grounded. The source electrode of MOS transistor 87 is connected to the level signal line 88, and the gate electrode is connected to the outgoing end of the horizontal scanning circuit 89. The end of the level signal line 88 is connected to the output terminal 90.
[0004] In the magnification mold solid state image sensor of the above-mentioned configuration, photo electric conversion of the incident light is carried out to the signal charge of the amount of charges according to the quantity of light with the pixel transistor 81. The signal according to the amount of incident light from the pixel transistor 81 is held through MOS transistor 85 which is a switch of operation at load-carrying capacity 86 through the perpendicular signal line 83. This held signal is outputted to the level signal line 88 through MOS transistor 87 which is the level switch controlled by the horizontal scanning circuit 89, and is further drawn from an output terminal 90 through this level signal line 88 outside.
[0005] In such a magnification mold solid state image sensor, an almost linearity output signal will be acquired to the signal charge accumulated in the unit pixel by photo electric conversion, and the dynamic range of an image sensor will be determined by the amount of signal charges which is a unit pixel and which can be accumulated. Drawing 9 is the input-output-behavioral-characteristics Fig. showing the relation between the amount of incident light of an image sensor, and the amount of output signals. The dynamic range of an image sensor will be decided by the amount of saturated signals and noise level of a pixel so that clearly from this input-output-behavioral-characteristics Fig.
[0006]
[Problem(s) to be Solved by the Invention] As mentioned above, in the conventional magnification mold solid state image sensor The amount of signal charges which can accumulate a unit pixel from there being a limitation according to the magnitude of a unit pixel Since the signal of the photographic subject of low brightness will be buried in a noise if the signal of the photographic subject of high brightness will be saturated if a diaphragm of a camera lens is doubled with the photographic subject of low brightness, and a diaphragm of a camera lens is conversely doubled with the photographic subject of high brightness, The dynamic range required of image

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charge accumulated in the pixel transistor 11 concerned is reset. Then, in a vertical-scanning period, now, supposing it is 1 / 60 seconds, the signal of the storage time of a second, and 1000 1/seconds will be held at load-carrying capacity 18 and 19, respectively (1/60-1/1000). These signals will be called L signal and S signal, respectively.

[0016] L held at this load-carrying capacity 18 and 19 and S signal are outputted to the level signal lines 22 and 23 through MOS transistors 20 and 21 which are level switches, and are further drawn as output signals OUT1 and OUT2 through output terminals 25 and 26 outside, respectively. When the relation of each amount of signals of the output signals OUT1 and OUT2 over the amount of incident light is illustrated here, it comes to be shown in drawing 4 . That is, another output signal OUT2 is not saturated to the amount R2 of incident light to an output signal OUT1 being saturated with the amount R1 of incident light equivalent to the case of the conventional example.

[0017] Thus, as opposed to one perpendicular signal line 13, two load-carrying capacity 18 and 19 is formed. While reading the signal outputted from the pixel of the multi-line from which the storage time differs by MOS transistors 16 and 17 through the perpendicular signal line 13 and making load-carrying capacity 18 and 19 memorize it The output signals OUT1 and OUT2 with which the storage times differ in coincidence are acquired from the single solid state image sensor 10 by having considered as the configuration which outputs the signal memorized by load-carrying capacity 18 and 19 through the level signal lines 22 and 23 by MOS transistors 20 and 21. Therefore, the video signal with which a pixel is saturated with the conventional solid state image sensor, and contrast is not acquired is outputted from another terminal, and although it is from a separate terminal, the signal which has contrast to the amount of incident light of the very large range is acquired.

[0018] In addition, although [this operation gestalt] two load-carrying capacity 18 and 19 is formed to one perpendicular signal line 13, it is also possible for it not to be restricted to two and to prepare three or more. In this case, it is necessary to prepare only a number with the same said of a switch of operation and the level switch.

[0019] Moreover, in the solid state image sensor 10 of the configuration of drawing 1 , since the signal from the pixel of a different line will be drawn by coincidence as output signals OUT1 and OUT2, when carrying out a display, an image processing, etc., it is inconvenient. The image pick-up equipment by this invention enabled it to cope with this.

[0020] Drawing 3 is the block diagram showing 1 operation gestalt of the image pick-up equipment by this invention. The pixel signal of the line scanned in drawing 3 after being outputted from a solid state image sensor 10 (in explanation of drawing 1) By letting the Rhine memory 31 for N line of FIFO (First In First Out) pass, an output signal OUT1 Time amount is doubled with the output signal OUT2 which is the same line as an output signal OUT1, and is outputted later than an output signal OUT1 (synchronization), and the digital disposal circuit 30 of a configuration of adding after that these output signals OUT1 and OUT2 by which synchronization was carried out with an adder 32 is used.

[0021] Here, as a capacity of the Rhine memory 22, there should just be a case of the configuration of drawing 1 by the line (m-p). This means that there will be little capacity of memory and it will end about phi**** line which shortened the storage time if it sets up so that it may be scanned ahead of long phiVm line of the storage time, as drawing 1 explained. It is because the storage time of phi**** line is expressed with aberration with phiVm line, and the product of horizontal scanning time amount, so the aberration of phi**** line and phiVm line will decrease and the capacity of memory will decrease as a result, if the storage time of phi**** line scanned previously is set up short.

[0022] Thus, if L signal (output signal OUT1) which is a pixel signal of the line scanned behind is memorized in the Rhine memory 22 and the pixel signal of the same line is outputted as an S signal (output signal OUT2) once again, the relation of the amount of incidence quantity of light pair output signals as shown in drawing 4 will be obtained by adding L signal and S signal and outputting as a video signal. Consequently, although sensibility changes bordering on the amount R1 of incident light and it becomes nonlinear relation so that clearly from the input-output-behavioral-characteristics Fig. of drawing 4 , the dynamic range as incident light is expanded by leaps and bounds.

[0023] By the way, in any solid state image sensors, since variation is in the amount of saturated signals of a pixel, if an output signal OUT1 and an output signal OUT2 are added simply, the variation in the amount of saturated signals of a pixel will appear in an image as it is in the range of the quantity of lights R1-R2 of drawing 4 . that is, in the range of the quantity of lights R1-R2, since the output signal OUT1 became the variation in the amount of saturated signals of a pixel, the addition signal (OUT1+OUT2) was superimposed on the output signal

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OUT2 on the variation in the amount of saturated signals of an output signal OUT1, i.e., a fixed pattern noise, — it will become a signal with a bad SN ratio very much.

[0024] With other operation gestalten of the image pick-up equipment by this invention, it has the composition that this can be coped with. Drawing 5 is the block diagram showing the configuration, among drawing, gives the same sign to drawing 3 and an equivalent part, and is shown. In the digital disposal circuit 30 concerning this operation gestalt, in order to remove the variation in the amount of saturated signals of the pixel mentioned above, it has composition which inserted the clipping circuit 33 between the outgoing end of the output signal OUT1 of a solid state image sensor 10, and the Rhine memory 31, and inserted the clipping circuit 34 between the outgoing end of an output signal OUT2, and the adder 32 further, respectively.

[0025] It is the circuit which replaces a certain signal more than fixed by the constant value in clipping circuits 33 and 34, and as the constant value of a certain, it sets up here so that it may take among the amounts of saturated signals of a pixel with variation smaller than the smallest value. In addition, about an output signal OUT2, since the amount R2 of incident light does not reach saturation level, when it does not desire a dynamic range beyond it, it is also possible so that clearly from the input-output behavioral characteristics of drawing 4 , although a clipping circuit 34 is inserted also in an output signal OUT2 side to omit a clipping circuit 34.

[0026] The input-output behavioral characteristics of clipping circuits 33 and 34 are shown in drawing 6 . By inserting the clipping circuits 33 and 34 with these input-output behavioral characteristics, since it clips with the clip level set up smaller than the amount of saturated signals of a pixel even if it reaches the saturation level whose output signal OUT1 is a pixel, it cannot be influenced of the variation in the amount of saturated signals of a pixel, i.e., a fixed pattern noise, and, therefore, a video signal with a high SN ratio can be acquired.

[0027] Moreover, it replaces with the linear input-output behavioral characteristics shown in drawing 6 , and by giving the nonlinear input-output behavioral characteristics shown in drawing 7 to a clipping circuit 33, the unnatural level difference property in the amount R1 of incident light in the input-output behavioral characteristics of drawing 4 can be canceled, and the input-output behavioral characteristics can be smoothed. Consequently, a video signal with natural gradation can be acquired.

[0028]

[Effect of the Invention] As explained above, according to the solid state image sensor by this invention, two or more storage means are established to one perpendicular signal line. By having considered as the configuration which outputs the signal memorized by these storage means through two or more level signal lines, while making two or more storage means memorize the signal outputted from the pixel of the multi-line from which the storage time differs through a perpendicular signal line Since the video signal which has contrast to the amount of incident light of the very large range besides the video signal with which a pixel is saturated and contrast is not acquired can be acquired, the dynamic range of the amount of incidence quantity of light pair output signals is expandable by leaps and bounds.

[0029] Moreover, according to the image pick-up equipment by this invention, the solid state image sensor which acquires two or more output signals based on the pixel of the multi-line from which the storage time differs is used. Since the signal from the pixel of a different line by having carried out synchronization of two or more output signals outputted from this solid state image sensor, and having considered as the configuration which adds these and is outputted as a video signal is not outputted to coincidence, Also when carrying out a display, an image processing, etc., while being able to acquire the video signal which does not cause trouble, the dynamic range of the amount of incidence quantity of light pair output signals is expandable.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing 1 operation gestalt of the solid state image sensor by this invention.
[Drawing 2] It is the input-output-behavioral-characteristics Fig. of the solid state image sensor by this invention.
[Drawing 3] It is the block diagram showing 1 operation gestalt of the image pick-up equipment by this invention.

[Drawing 4] It is the input-output-behavioral-characteristics Fig. of the image pick-up equipment by this invention.
[Drawing 5] It is the block diagram showing other operation gestalten of the image pick-up equipment by this invention.
[Drawing 6] It is the input-output-behavioral-characteristics Fig. of an example of a clipping circuit.
[Drawing 7] It is the input-output-behavioral-characteristics Fig. of other examples of a clipping circuit.
[Drawing 8] It is the block diagram showing the conventional example.
[Drawing 9] It is the input-output-behavioral-characteristics Fig. of the conventional example.
[Description of Notations]
10 Solid State Image Sensor
11 Pixel Transistor
12 Perpendicular Selection Line
13 Perpendicular Signal Line
14 Vertical-Scanning Circuit
15 Electronic Shutter Scanning Circuit
16 17 MOS transistor (switch of operation)
18 19 Load-carrying capacity
20 21 MOS transistor (level switch)
22 23 Level signal line
24 Horizontal Scanning Circuit
25 26 Output terminal
30 Digital Disposal Circuit
31 Rhine Memory
32 Adder
33 34 Clamping circuit

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